

**Stefan
Schulz**

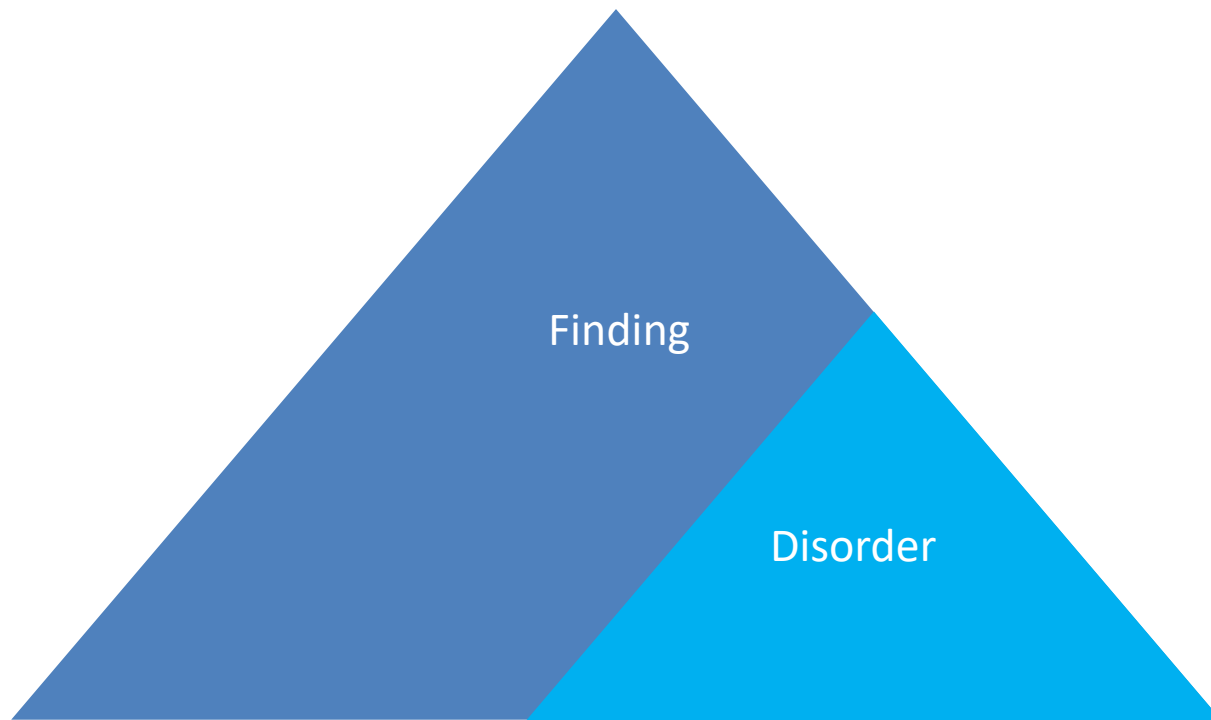
Medical University
of Graz (Austria)



SNOMED CT's Condition / Situation approach related to OGMS

**ICBO 2013
Montreal
OGMS Meeting**

What are SNOMED CT findings and disorders – ontologically ?



Background

- Awareness of heterogeneity of the SNOMED CT hierarchies "finding", "disorder", "event": addressed by the IHTSDO SIG "Event – Condition – Episode" (ECE), after meeting with Barry Smith on October 2009
- Need for "common ontology" between future ICD 11 and SNOMED CT: joint advisory group IHTSDO + WHO

Example

Search SNOMED CT®:

☒ All Descriptions | ☐ Fully Specified Name Only | ☐ Concept Identifier | ☐ Description Identifier

[Click here](#) for Advanced search help

Parent(s):

(Select a parent to make it the "Current Concept".)

Fracture of midfacial bones (disorder)

Fracture of skull and facial bones (disorder)

Injury of nasal bones (disorder)

Current Concept:

Fractured nasal bones (disorder)

Child(ren):

(N=2) (Select a child to make it the "Current Concept".)

Closed fracture of nasal bones (disorder)

Open fracture of nasal bones (disorder)

Current Concept:

Fully Specified Name: Fractured nasal bones (disorder)

ConceptId: 263171005

Defining Relationships:

Is a Fracture of midfacial bones (disorder)

Is a Fracture of skull and facial bones (disorder)

Is a Injury of nasal bones (disorder)

Group 1

Associated morphology Fracture (morphologic abnormality)

Finding site Nasal bone structure (body structure)

This concept is fully defined.

Qualifiers:

Descriptions (Synonyms):

Fully Specified Name: Fractured nasal bones (disorder)

Preferred: Fractured nasal bones [391307015]

Synonym: Broken nose [391308013]

Synonym: Fractured nose [391309017]

Synonym: Fracture of nose [391310010]

Synonym: Fracture of nasal complex [391311014]

Synonym: Fracture of nasal bones [391312019]

Related Concepts:

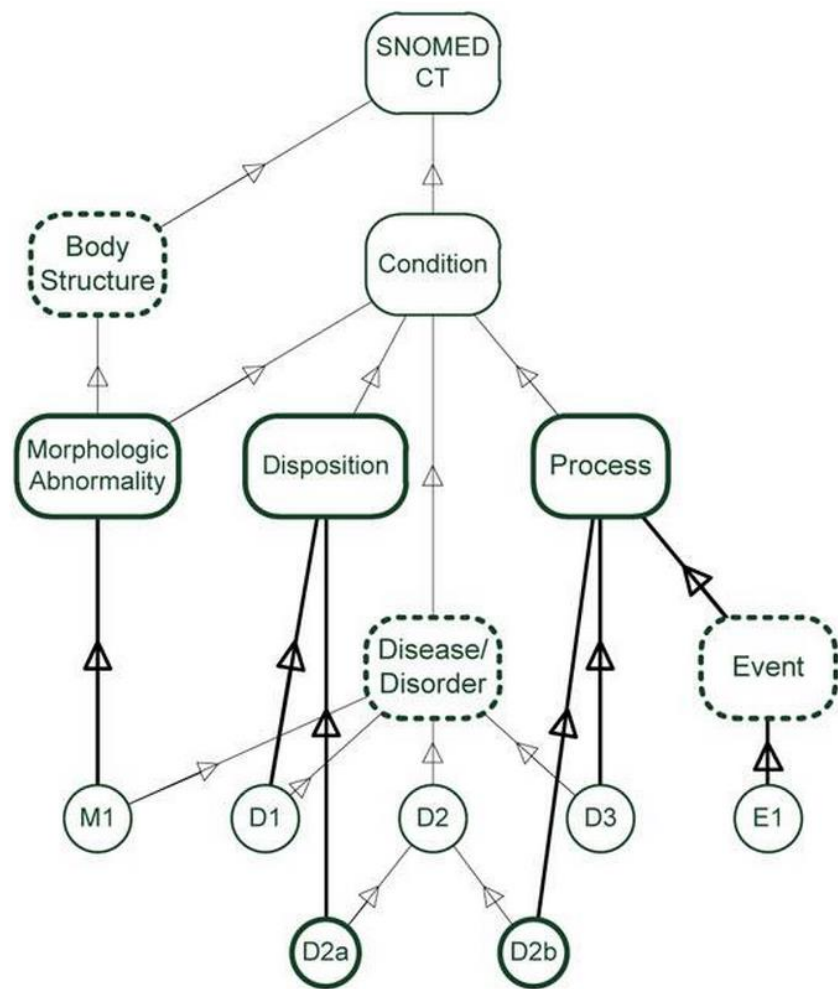
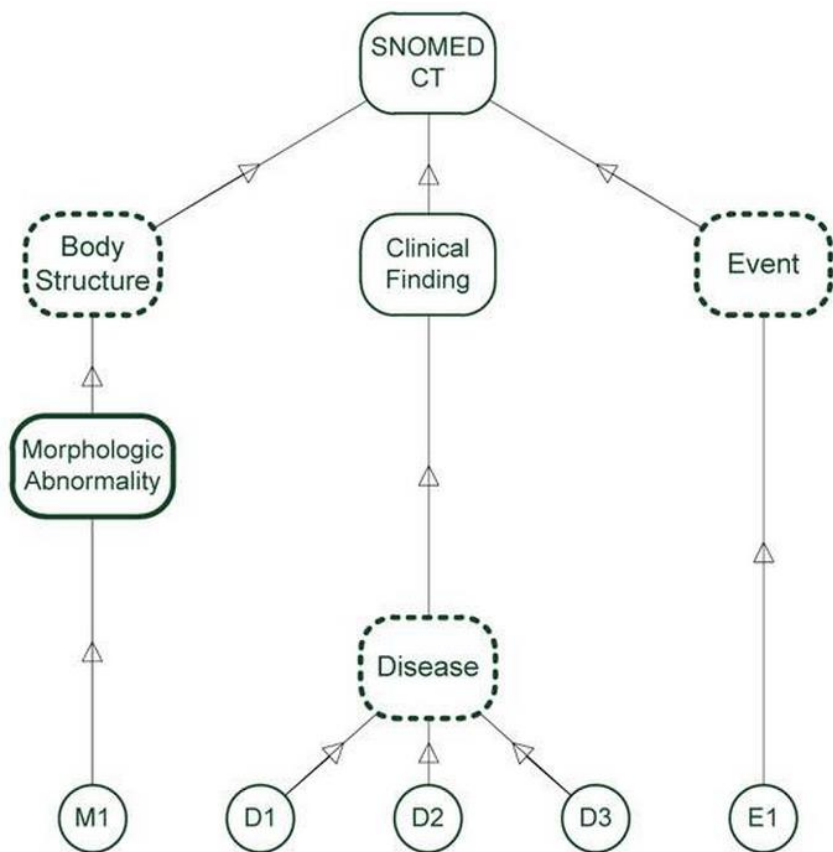
- All "Is a" antecedents -

- All descendants/subtypes -

- Related concepts demo -

From findings to conditions

- ECE, after discussion of OGMS (2009): Interpretation of SNOMED codes under "finding" (including "disorder") as "condition"
- Publication: Scalable representations of diseases in biomedical ontologies. Schulz S, Spackman K, James A, Cocos C, Boeker M. J Biomed Semantics. 2011



"Clinical condition" (I)

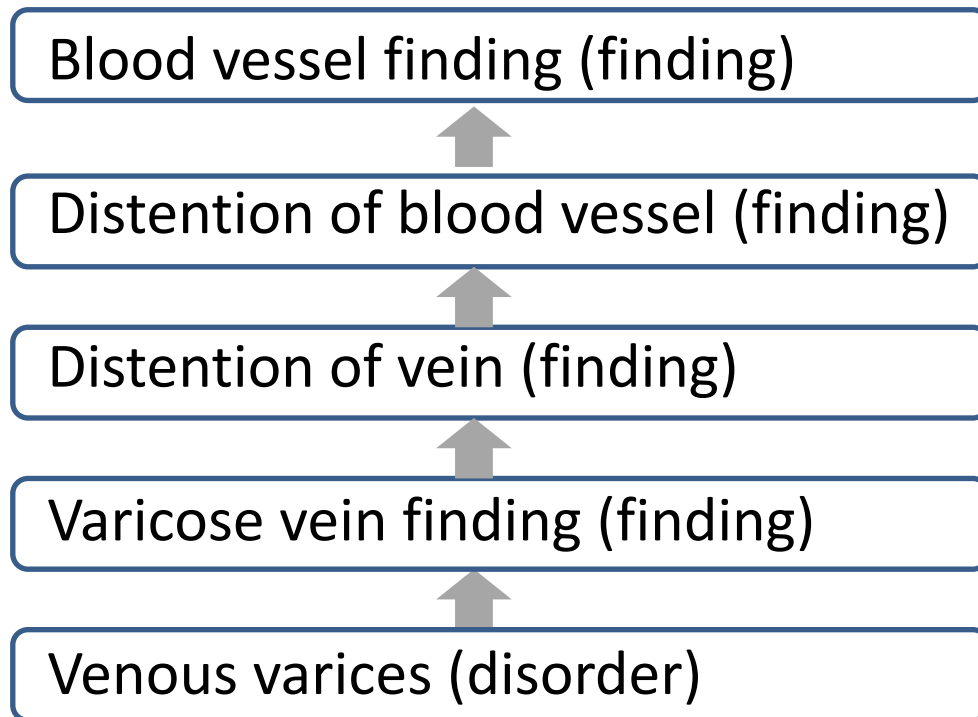
- Current SNOMED finding classes are ambiguous
- Physicians (often) have no problem with this ambiguity
- 'Clinical condition' equivalentTo
 - 'clinical disposition' or
 - 'clinical structure' or
 - 'clinical process'

"Clinical condition" (II)

- Disambiguation according to needs:
Allergic disposition vs. allergic reaction
 - Allergy and Disposition
 - Allergy and Process
- Allergy and inheresIn X → classified as Disposition (ogms:Disease)
- Allergy and hasParticipant X → classified as Process (ogms:Disease course)

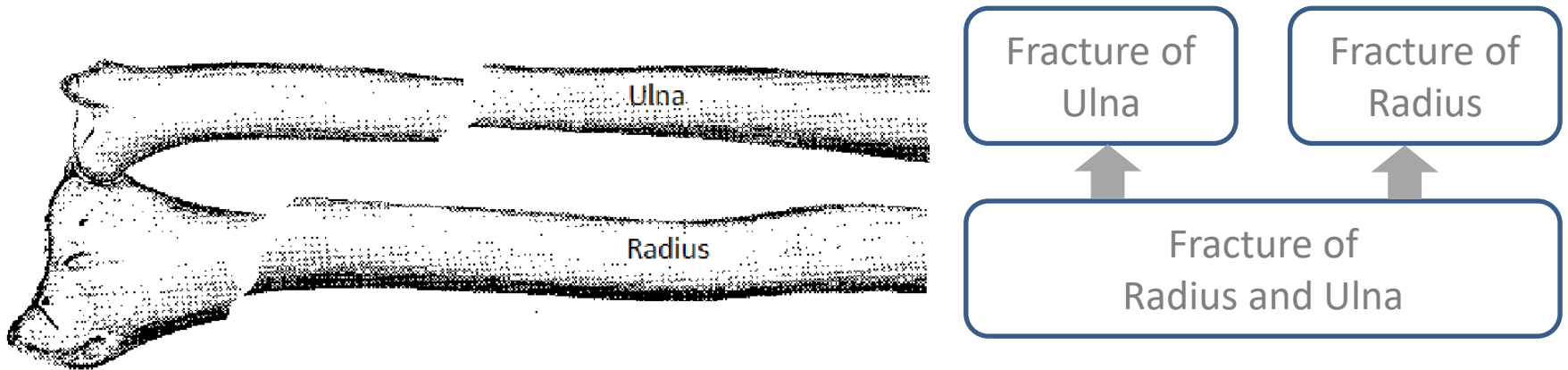
Problem not solved (I)

- Naming suggest clear commitment, which creates category conflicts between parents and children:

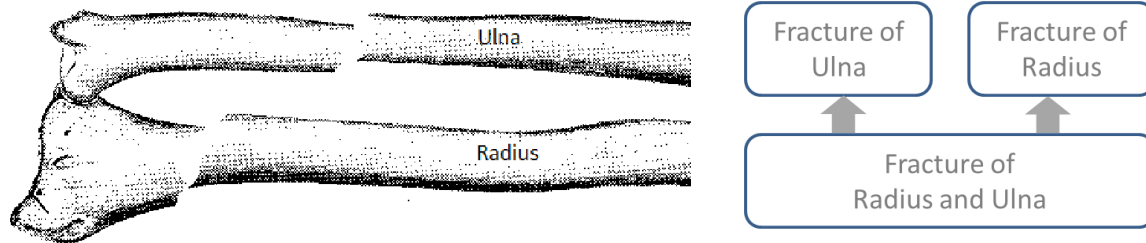


Problem not solved (II)

- Multiple parenthood difficult to interpret

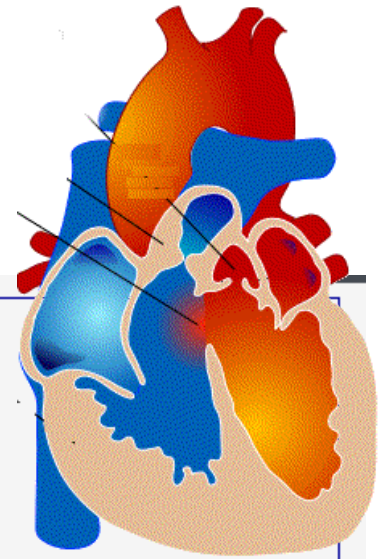


Is this True?



- FALSE, if X means “pathological condition”
- TRUE, if X means “situation with X” or “patient having X”

Example 2



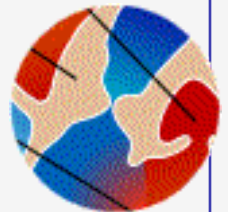
Current Concept:

Fully Specified Name: Tetralogy of Fallot (disorder)

ConceptId: 86299006

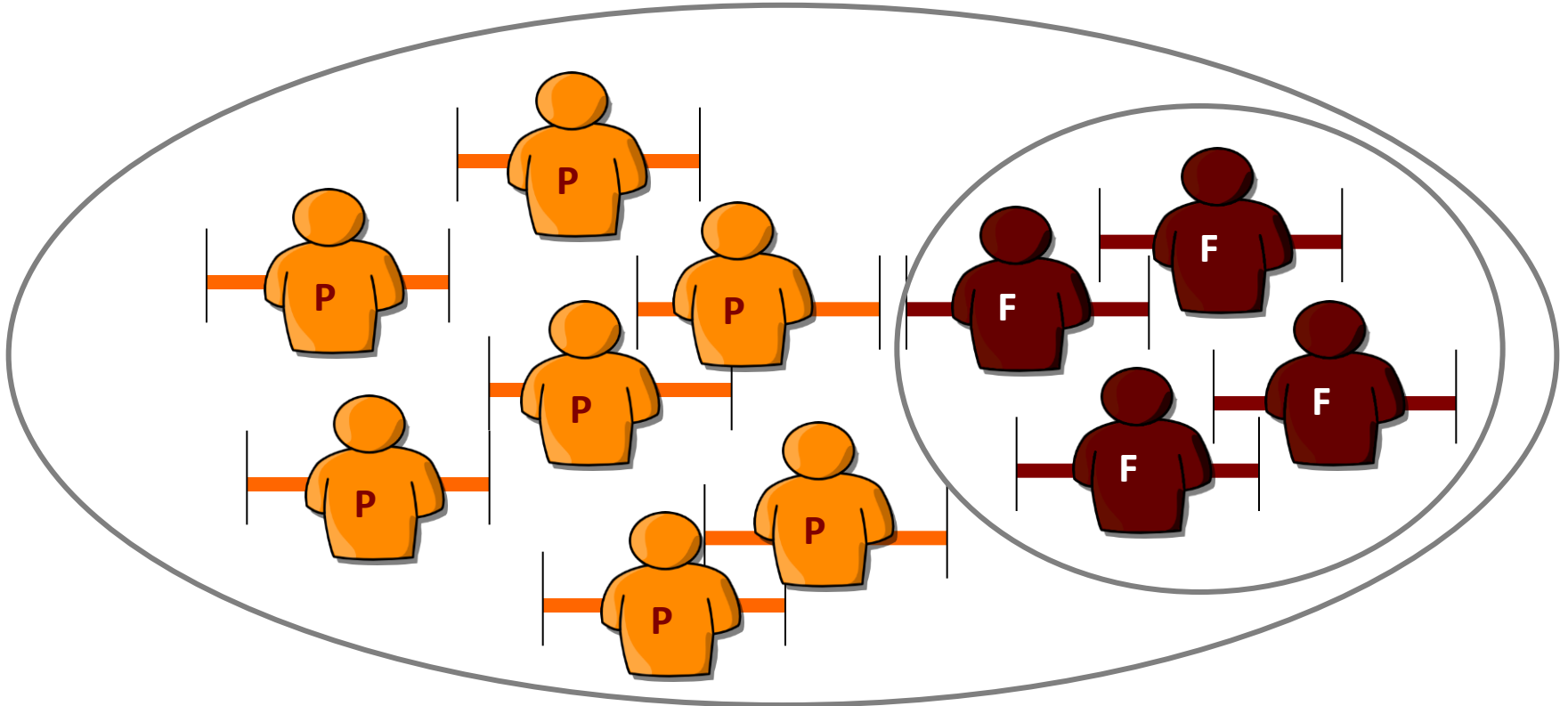
Defining Relationships:

- | | |
|--------------------|--|
| <i>Is a</i> | Congenital abnormality of ventricles and ventricular septum (disorder) |
| <i>Is a</i> | Overriding aorta (disorder) |
| <i>Is a</i> | Pulmonic valve stenosis (disorder) |
| <i>Is a</i> | Right ventricular hypertrophy (disorder) |
| <i>Is a</i> | Ventricular septal defect (disorder) |



Example 2

Extension of “**Situation with Pulmonic Valve Stenosis**” includes extension of “**Situation with Tetralogy of Fallot**”: **TRUE**



Two diverging interpretations of finding / disorder terms in SNOMED CT and ICD:

- They denote patient-borne **Conditions** such as body processes, states, dispositions, or (patho-) anatomical structures, which are reportable in the context of medical records
- They denote Clinical **Situations**, which are defined as phases of a patient's life, during which he/she is bearer of (some combination of) pathological conditions.
- Only the situation interpretation is compatible with the current state of SNOMED CT (multiple taxonomies, "A with B" concepts, role groups)
- Low inter-modeller agreement when trying to partition SNOMED CT findings into conditions and situations

(Stefan Schulz, Alan Rector, Jean-Marie Rodrigues, Kent Spackman. Competing Interpretations of Disorder Codes in SNOMED CT and ICD AMIA Annu Symp Proc. 2012; 2012: 819–827)

Situations, conditions and role groups

'Fracture of radius AND ulna (disorder)' equivalentTo

'Fracture of radius (disorder)' and *'Fracture of ulna (disorder)'* and

Group some (**'Associated morphology'** some *'Fracture (morphologic abnormality)'*) and

'Finding site' some *'Bone structure of radius (body structure)'*) and

Group some (**'Associated morphology'** some *'Fracture (morphologic abnormality)'*) and

'Finding site' some *'Bone structure of ulna (body structure)'*)

'Fracture of radius (disorder)' equivalentTo

'Fracture of forearm (disorder)' and *'Injury of radius (disorder)'* and

Group some (**'Associated morphology'** some *'Fracture (morphologic abnormality)'*) and

'Finding site' some *'Bone structure of radius (body structure)'*)

'Fracture of ulna (disorder)' equivalentTo

'Fracture of forearm (disorder)' and *'Injury of ulna (disorder)'* and

Group some (**'Associated morphology'** some *'Fracture (morphologic abnormality)'*) and

'Finding site' some *'Bone structure of ulna (body structure)'*)

Situations, conditions and role groups

'Fracture of radius AND ulna (Situation)' equivalentTo

'Fracture of radius (Situation)' and *'Fracture of ulna (Situation)'* and

hasCondition some (**'Associated morphology'** some *'Fracture (morphologic abnormality)'*) and

'Finding site' some *'Bone structure of radius (body structure)'*) and

hasCondition some (**'Associated morphology'** some *'Fracture (morphologic abnormality)'*) and

'Finding site' some *'Bone structure of ulna (body structure)'*)

'Fracture of radius (disorder)' equivalentTo

'Fracture of forearm (Situation)' and *'Injury of radius (Situation)'* and

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'Fracture of forearm (Situation)' and *'Injury of ulna (Situation)'* and

hasCondition some (**'Associated morphology'** some *'Fracture (morphologic abnormality)'*) and

'Finding site' some *'Bone structure of ulna (body structure)'*)

The Ontology of Clinical Situations

Andrade, Martínez-Costa,
Spackman, Almeida,
Schulz

Currently under review
(Applied ontology)

A '*Clinical Situation X* [D2]' is a **temporal part** (phase of an occurrent) of an entity's life during which some '*Clinical Condition X*' is **present**

In contrast to D1 this definition restricts clinical situation to life phases and follows closely the meaning embedded into the above relation '**has condition**':

'*Clinical Situation X* [D2]' equivalentTo

Process and ('**temporal part of**' some *Life*)

and ('**has condition**' some '*Clinical Condition X*'))

Life is here not understood in a biological sense. It means the process between an entity's coming into existence and going out of existence. The "life" of a building is therefore different from the life of a person. With '*Clinical Situation*' being a **Process** that is '**temporal part of**' some *Life*, '*Cancer Situation*' would be represented as:

'*Cancer Situation*' equivalentTo '*Clinical Situation*' and '**has condition**' some *Cancer*

It is here of no consequence whether the cancer is seen as a material entity or a process. A situation without cancer is also a situation:

'*Situation without Cancer*' equivalentTo '*Clinical Situation*' and not '*Cancer Situation*'

Accordingly, a '*Clinical Situation XY*' is a phase of a patient's life for which some '*Clinical Condition X*' and some '*Clinical Condition Y*' is wholly present:

'*Clinical Situation X Y*' equivalentTo '*Clinical Situation*' and

'**has condition**' some '*Clinical Condition X*' and

'**has condition**' some '*Clinical Condition Y*')

Which is the same as:

'*Clinical Situation X Y*' equivalentTo '*Clinical Situation X*' and '*Clinical Situation Y*'